AP Bio Big Idea 4: Interactions - Biological systems interact, and these systems and their interactions possess complex properties; 4A5 LO 4.11 (SP 1.4, 4.1), LO 4.13 (SP 6.4), 4A6 LO 4.16 (SP6.4), 4B3 LO 4.19 (SP 2.2, 5.2)

Cave Explorers Activity

Objectives

With these investigations, students will:

1. Observe and infer trends and characteristics
2. Construct a scientific explanation

This activity hits observation, measurement, inference, CER concepts, collaboration, etc…here's the setup - i don't tell this story until session 2...obv edit for your needs - the description in the first sentence literally describes the location of the school!

> Ecologists have recently discovered a system of caves in the Capital region of the Hudson Valley neighborhood in Albany, NY. These caves appear to have protected an ecosystem, that has never been encountered or observed before. Nothing is known about the organisms in these caves - not anatomy, physiology, behavior, or ecological interactions. As the first scientists to encounter these organisms, it is up to each group to observe and characterize them. Be sure to include observations of the entire ecosystem, or ecosystem, depending on where you're from, AS A WHOLE i.e. the relationships between organisms with different phenotypes. The goal is to be able to understand and describe any trends or patterns in the way the organisms are distributed within this particular ecosystem, or ecosystem, depending on where you're from. Move around the environment making and recording observations (EVIDENCE) - do not make up evidence or overstate the observations - BE OBJECTIVE.

The "day before" the lab, prep and place the cave organisms (pipe cleaners)**:**

Color	# Ends	Characteristics
Green - triangle	0	Always around water source; found alone (as doubles) or paired with black - when paired with black appear bigger (doubles)
Yellow - cursive L	2	Found alone (singles) in dark areas; only near orange- when paired with orange, appear bigger (also singles)
Blue - fish shaped	2	Found up high and near light; found alone (doubles) or paired with black stars - when paired with black, appear to be damaged (singles)
Orange- straight	2	Near black surfaces and near light; (triples) or by yellow (appear smaller) and black (appear damaged), also found with red
Black - star	6	Found in light places (singles); when found with green appears bigger (doubles)
Red-pleated	3	Only found on floor (triples), usually alone but appear bigger (as doubles) when paired with orange
Purple-corkscrew	2	Always alone, singles on floor, doubles on chairs, triples on counters.

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- Use as many colors as you need - one color per group: each color represents one organism - intertwined colors represent some kind of symbiotic relationship
    - Next year i am thinking about using a wider variety of materials: rubber bands, paper clip and paper clip chains, etc!
    - Use any shape you want for each type of organism
    - Vary water source temps...have standing water vs flowing water...have "prey" in the water?
- You could vary sizes if you want - "damaged" = smaller sizes or bent/crooked/etc
- Colors of substrate obv depends on your classroom

I have 50 min periods, so this is a three day lab:

1. **Part 1 of the write up/Session 1/Day 1:**
    1. Intro - review of ecology definitions
    2. Prelab - make data table in lab book

2. **Part 2 of the write up/Session 2/Day 2:**
    1. Intro - tell them the story outside the class - the class is the entrance to the cave system; talk about "rules when entering undiscovered habitats"
        a. Be careful where you step so you don't disturb anything or kill anything
        b. Be careful where you place your materials bc see above
        c. It may be advantageous to assign each group a wall to start their observations from and have them rotate
        d. Remind each group to make as many observations about all organisms as possible
        e. I remind them all measurements need to be in SI and need to be as accurate and precise as possible
        f. I give them half the period to make their observations
        g. ***They will only be filling out the left column of their data table while they're "in the cave making observations"***
    2. Data Analysis - After the observations portion, assign each group a specific color to focus on; they will then fill out the right column of their data table using the vocab words from the intro of day 1
    3. CER - they then need to write a CER for their assigned organism - describe the niche of their organism

3. **Part 3 of the write up/Session 3/Day 3:**
    1. Seminar - each group will share their organism's niche while the other groups take notes
        a. Have them share their observations and reasonings - other groups will need them for the final project
        b. Have each group add to their notes/data tables
        c. Talk them through the ecology concepts...talk them through possible limitations of their observations i.e. they were only in the cave for a day, did they know what was in the water, did they take temps, etc...
    2. Plan project
        a. I give them a choice of either doing their project, collab with other groups, or have each group contribute to one big final class project